REMARKS

This paper is responsive to a non-final Office action dated June 5, 2003. Claims 1-24 were examined. Claims 2 and 17 are objected to by the Examiner. Claims 1, 2, 14-17, 23, and 24 stand rejected. Claims 3-13 and 18-22 stand objected to as being dependent upon rejected base claims.

Claim Objections

The Examiner objected to the usage of the word "such" in claims 2 and 17. Claims 2 and 17 have been amended to recite "the segments from the other layers."

Claim Rejections Under 35 U.S.C. § 102

Claims 1, 2, 14-17, 23, and 24 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,182,272 to Andreev et al. Claims 1, 2, 14-17, 23, and 24 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,415,427 to Nitta et al. Claims 1, 14-16, 23, and 24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,748,844 to Marks. Each of these rejections is respectfully traversed as outlined below.

Claim 1 has been amended to improve clarity with respect to individual ones of the plurality of subgraphs corresponding to respective ones of a plurality of layers of circuitry. Regarding amended claim 1, Applicants respectfully maintain that Andreev fails to teach or suggest:

> generating a plurality of subgraphs, wherein individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of circuitry, respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of circuitry,

as recited by amended claim 1. The Office Action relies on Figure 7 of Andreev to supply this teaching. Figure 7 of Andreev teaches in steps 306 and 308 and the related discussion at col. 7,

line 7-col. 8, line 36, constructing a graph for each net. "In step 306, the allowed layers for each edge of the current net's global routing description are identified" for each net (col. 7, lines 27-28). "In step 308 a graph is constructed for the current net, and the edges of the graph are enumerated" (col. 7, lines 42-44). Each graph generated by Andreev corresponds to an individual net and includes associations to a combination of layers which result in a minimum penalty (col. 8, lines 3-26). Even if the graphs of Andreev are similar to the subgraphs of claim 1, and Applicants do not concede that the graphs of Andreev are similar to the subgraphs of claim 1, Andreev fails to teach or suggest that the graphs correspond to respective ones of a plurality of layers, as required by amended claim 1. Accordingly, Applicants respectfully request that the rejection of independent claim 1, and dependent claims 2 and 14 be withdrawn.

The Office Action has also rejected claims 1, 2, and 14 over Nitta. As with Andreev, Applicants respectfully maintain that Nitta fails to teach or suggest:

> generating a plurality of subgraphs, wherein individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of circuitry, respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of circuitry,

as recited by amended claim 1. The Office Action relies on claim 1 and Figure 7 of Nitta to supply this teaching. These sections of Nitta teach global routing processing, which generates a Steiner tree for each of n nets. At col. 8, lines 59-66, Nitta teaches that step S4 of Figure 7 collects subtrees having an intersection of three or more branches on a particular Steiner tree. Thus, Nitta teaches subtrees corresponding to each of n nets and path collections corresponding to particular branches. Even if the subtrees or the path collections of Nitta are similar to the subgraphs of claim 1, and Applicants do not concede that the subtrees or the path collections of Nitta are similar to the subgraphs of claim 1, these subtrees and path collections do not correspond to each of a plurality of layers. Thus, Nitta fails to teach or suggest that individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of

circuitry, as required by amended claim 1. Accordingly, Applicants respectfully request that the rejection of independent claim 1 and dependent claims 2 and 14 be withdrawn.

Finally, the Office Action has rejected claims 1, 2, and 14 over Marks. Applicants respectfully maintain that Marks fails to teach or suggest:

> generating a plurality of subgraphs, wherein individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of circuitry, respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of circuitry,

as recited by amended claim 1. The Office Action relies on claim 1 and Figure 3 of Marks to supply this teaching. Marks teaches a general system that may be applied to partitioning problems that arise in circuit design. Claim 1 and Figure 3 of Marks teach partitioning a graph having nodes coupled together by edges using a seed-growth heuristic and a stochastic-search process followed by the Kernighan-Lin algorithm. However, as with Andreev and Nitta, Marks fails to teach or suggest a plurality of subgraphs corresponding to respective ones of a plurality of layers of circuitry. Furthermore, Marks fails to teach or suggest respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of circuitry, as required by amended claim 1.

For at least these reasons, Applicants believe that independent claim 1 and dependent claims 2 and 14 are allowable over Andreev, Nitta, and Marks, alone or in combination. Accordingly, Applicants respectfully request that the rejection of claims 1, 2, and 14 be withdrawn.

Claim 15 has been amended to recite generating a subgraph corresponding to a routing layer. Applicants respectfully maintain that Andreev fails to teach or suggest:

> generating a subgraph corresponding to a routing layer and including a plurality of route segments based on information from the corresponding routing layer and a

> plurality of route segments based on information from other routing layers,

as recited by amended claim 15. The Office Action apparently relies on Figure 7 of Andreev to supply this teaching. Figure 7 of Andreev teaches in steps 306 and 308 and the related discussion at col. 7, line 7-col. 8, line 36, constructing a graph for each net. "In step 306, the allowed layers for each edge of the current net's global routing description are identified" for each net (col. 7, lines 27-28). "In step 308 a graph is constructed for the current net, and the edges of the graph are enumerated" (col. 7, lines 42-44). Each graph generated by Andreev corresponds to an individual net and includes associations to a combination of layers which result in a minimum penalty (col. 8, lines 3-26). Even if the graphs of Andreev are similar to the subgraph of claim 15, and Applicants do not concede that the graphs of Andreev are similar to the subgraph of claim 15, Andreev fails to teach or suggest that the graphs correspond to a routing layer, as required by amended claim 15. Accordingly, Applicants respectfully request that the rejection of claim independent claim 15 be withdrawn.

The Office Action also rejected claim 15 over Nitta. As with Andreev, Applicants respectfully maintain that Nitta fails to teach or suggest:

> generating a subgraph corresponding to a routing layer and including a plurality of route segments based on information from the corresponding routing layer and a plurality of route segments based on information from other routing layers,

as recited by amended claim 15. The Office Action apparently relies on claim 1 and Figure 7 of Nitta to supply this teaching. These sections of Nitta teach global routing processing, which generates a Steiner tree for each of n nets. At col. 8, lines 59-66, Nitta teaches that step S4 of Figure 7 collects subtrees having an intersection of three or more branches on a particular Steiner tree. Thus, Nitta teaches subtrees corresponding to each of n nets and path collections corresponding to particular branches. Even if the subtrees or the path collections of Nitta are similar to the subgraph of claim 15, and Applicants do not concede that the subtrees or the path collections of Nitta are similar to the subgraph of claim 15, these subtrees and path collections do not each correspond to a routing layer. Thus, Nitta fails to teach or suggest a subgraph

corresponding to a routing layer, as required by amended claim 15. Accordingly, Applicants respectfully request that the rejection of independent claim 15 be withdrawn.

Finally, the Office Action has rejected claim 15 over Marks. Applicants respectfully maintain that Nitta fails to teach or suggest:

> generating a subgraph corresponding to a routing layer and including a plurality of route segments based on information from the corresponding routing layer and a plurality of route segments based on information from other routing layers,

as recited by amended claim 15. The Office Action apparently relies on claim 1 and Figure 3 of Marks to supply this teaching. Marks teaches a general system that may be applied to partitioning problems that arise in circuit design. Claim 1 and Figure 3 of Marks teach partitioning a graph having nodes coupled together by edges using a seed-growth heuristic and a stochastic-search process followed by the Kernighan-Lin algorithm. However, as with Andreev and Nitta, Marks fails to teach or suggest generating a subgraph corresponding to a routing layer. Furthermore, Marks fails to teach including a plurality of route segments based on information from the corresponding routing layer and a plurality of route segments based on information from other routing layers, as required by amended claim 15.

For at least these reasons, Applicants believe that independent claim 15 is allowable over Andreev, Nitta, and Marks, alone or in combination. Accordingly, Applicants respectfully request that the rejection of claim 15 be withdrawn.

Claim 16 has been amended to improve clarity with respect to individual ones of the plurality of subgraphs corresponding to respective ones of a plurality of layers of routing data. Regarding amended claim 16, Applicants respectfully maintain that Andreev fails to teach or suggest:

> a first module for generating a plurality of subgraphs, wherein individual ones of the plurality of subgraphs correspond to respective ones of a plurality

> of layers of the routing data, respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of the routing data,

as recited by amended claim 16. The Office Action apparently relies on Figure 7 of Andreev to supply this teaching. Figure 7 of Andreev teaches in steps 306 and 308 and the related discussion at col. 7, line 7-col. 8, line 36, constructing a graph for each net. "In step 306, the allowed layers for each edge of the current net's global routing description are identified" for each net (col. 7, lines 27-28). "In step 308 a graph is constructed for the current net, and the edges of the graph are enumerated" (col. 7, lines 42-44). Each graph generated by Andreev corresponds to an individual net and includes associations to a combination of layers which result in a minimum penalty (col. 8, lines 3-26). Even if the graphs of Andreev are similar to the subgraphs of claim 16, and Applicants do not concede that the graphs of Andreev are similar to the subgraphs of claim 16, Andreev fails to teach or suggest that the graphs correspond to respective ones of a plurality layers of routing data, as required by amended claim 16. Accordingly, Applicants respectfully request that the rejection of independent claim 16, and dependent claims 17 and 23 be withdrawn.

The Office Action has also rejected claims 16, 17, and 23 over Nitta. As with Andreev, Applicants respectfully maintain that Nitta fails to teach or suggest:

> a first module for generating a plurality of subgraphs, wherein individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of the routing data, respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of the routing data,

as recited by amended claim 16. The Office Action apparently relies on claim 1 and Figure 7 of Nitta to supply this teaching. These sections of Nitta teach global routing processing, which generates a Steiner tree for each of n nets. At col. 8, lines 59-66, Nitta teaches that step S4 of

Figure 7 collects subtrees having an intersection of three or more branches on a particular Steiner tree. Thus, Nitta teaches subtrees corresponding to each of n nets and path collections corresponding to particular branches. Even if the subtrees or the path collections of Nitta are similar to the subgraphs of claim 16, and Applicants do not concede that the subtrees or the path collections of Nitta are similar to the subgraphs of claim 16, these subtrees and path collections do not correspond to each of a plurality of layers of routing data. Thus, Nitta fails to teach or suggest that individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of the routing data, as required by amended claim 16. Accordingly, Applicants respectfully request that the rejection of independent claim 16 and dependent claims 17 and 23 be withdrawn.

Finally, the Office Action has rejected claims 16, 17, and 23 over Marks. Applicants respectfully maintain that Marks fails to teach or suggest:

> a first module for generating a plurality of subgraphs, wherein individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of the routing data, respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of the routing data,

as recited by amended claim 16. The Office Action apparently relies on claim 1 and Figure 3 of Marks to supply this teaching. Marks teaches a general system that may be applied to partitioning problems that arise in circuit design. Claim 1 and Figure 3 of Marks teach partitioning a graph having nodes coupled together by edges using a seed-growth heuristic and a stochastic-search process followed by the Kernighan-Lin algorithm. However, as with Andreev and Nitta, Marks fails to teach or suggest that individual ones of the plurality of subgraphs correspond to respective ones of a plurality of layers of the routing data. Furthermore, Marks fails to teach or suggest respective ones of the plurality of subgraphs including a plurality of segments based on information from other layers of the routing data, as required by amended claim 16.

For at least these reasons, Applicants believe that independent claim 16 and dependent claims 17 and 23 are allowable over Andreev, Nitta, and Marks, alone or in combination. Accordingly, Applicants respectfully request that the rejection of claims 16, 17, and 23 be withdrawn.

Regarding claim 24, Applicants respectfully maintain that Andreev fails to teach or suggest:

> a first subgraph corresponding to a first circuit layer, the first subgraph including a set of routing segments selected using information from the first circuit layer and at least one other circuit layer,

as recited by claim 24. The Office Action apparently relies on Figure 7 of Andreev to supply this teaching. Figure 7 of Andreev teaches in steps 306 and 308 and the related discussion at col. 7, line 7-col. 8, line 36, constructing a graph for each net. "In step 306, the allowed layers for each edge of the current net's global routing description are identified" for each net (col. 7, lines 27-28). "In step 308 a graph is constructed for the current net, and the edges of the graph are enumerated" (col. 7, lines 42-44). Each graph generated by Andreev corresponds to an individual net and includes associations to a combination of layers which result in a minimum penalty (col. 8, lines 3-26). Even if the graphs of Andreev are similar to the subgraph of claim 24, and Applicants do not concede that the graphs of Andreev are similar to the subgraph of claim 24, Andreev fails to teach or suggest that a first subgraph includes a set of routing segments selected using information from a first circuit layer and at least one other circuit layer, as required by claim 24. Accordingly, Applicants respectfully request that the rejection of independent claim 24 be withdrawn.

The Office Action has also rejected claim 24 over Nitta. As with Andreev, Applicants respectfully maintain that Nitta fails to teach or suggest:

> a first subgraph corresponding to a first circuit layer, the first subgraph including a set of routing

> segments selected using information from the first circuit layer and at least one other circuit layer,

as recited by claim 24. The Office Action apparently relies on claim 1 and Figure 7 of Nitta to supply this teaching. These sections of Nitta teach global routing processing, which generates a Steiner tree for each of n nets. At col. 8, lines 59-66, Nitta teaches that step S4 of Figure 7 collects subtrees having an intersection of three or more branches on a particular Steiner tree. Thus, Nitta teaches subtrees corresponding to each of n nets and path collections corresponding to particular branches. Even if the subtrees or the path collections of Nitta are similar to the subgraph of claim 24, and Applicants do not concede that the subtrees or the path collections of Nitta are similar to the first subgraph of claim 24, these subtrees and path collections do not correspond to a first circuit layer. Thus, Nitta fails to teach or suggest a first subgraph corresponding to a first circuit layer, the first subgraph including a set of routing segments selected using information from the first circuit layer and at least one other circuit layer, as required by claim 24. Accordingly, Applicants respectfully request that the rejection of independent claim 24 be withdrawn.

Finally, the Office Action has rejected claim 24 over Marks. Applicants respectfully maintain that Marks fails to teach or suggest:

> a first subgraph corresponding to a first circuit layer, the first subgraph including a set of routing segments selected using information from the first circuit layer and at least one other circuit layer,

as recited by claim 24. The Office Action apparently relies on claim 1 and Figure 3 of Marks to supply this teaching. Marks teaches a general system that may be applied to partitioning problems that arise in circuit design. Claim 1 and Figure 3 of Marks teach partitioning a graph having nodes coupled together by edges using a seed-growth heuristic and a stochastic-search process followed by the Kernighan-Lin algorithm. However, as with Andreev and Nitta, Marks fails to teach or suggest a first subgraph corresponding to a first circuit layer. Furthermore, Marks fails to teach or suggest a first subgraph including a set of routing segments selected using

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information from the first circuit layer and at least one other circuit layer, as required by claim 24.

For at least these reasons, Applicants believe that independent claim 24 is allowable over Andreev, Nitta, and Marks, alone or in combination. Accordingly, Applicants respectfully request that the rejection of claim 24 be withdrawn.

Allowable Subject Matter

Applicants appreciate the indication of allowable subject matter for claims 3-13 and 18-22. Applicants respectfully maintain that claims 3-13 and 18-22 depend from allowable base claims. Accordingly, Applicants respectfully request that the objection to claims 3-13 and 18-22 be withdrawn.

Claim 4 has been amended to recite generating the first and second sets for individual ones of the plurality of layers of circuitry. Claim 11 has been amended to recite that the second information includes a marking of individual ones of the plurality of points indicating possible coverage of the points by elements in other layers disposed in the first direction from the first layer.

New claims 25-29 have been added. Claim 25 depends from independent claim 24. Claims 26-29 depend from independent claim 15. Thus, Claims 25-29 depend from allowable claims and are allowable for at least this reason.

In summary, claims 1-29 are in the case. Claims 25-29 have been added. Claims 1, 2, 4, 11, 15, 16, and 17 have been amended. All claims are believed to be allowable over the art of record, and a Notice of Allowance to that effect is respectfully solicited. Nonetheless, if any issues remain that could be more efficiently handled by telephone, the Examiner is requested to call the undersigned at the number listed below.

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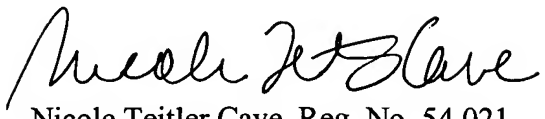

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